

***Podospora petrogale* (Fungi: Sordariales: Lasiosphaeriaceae), A New Species From Australia**

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Abstract

A new species, *Podospora petrogale* is described from the dung of the Black footed Rock Wallaby (*Petrogale lateralis*) collected in the desert region in the Northern Territory of Australia.

Introduction

It has long been known that the dung of herbivorous mammals provides a rich substrate for a vast assemblage of fascinating and specialised fungi, many of which are restricted to that substrate. The *dung fungi* (as they are generally referred to by devotees), exhibit many beautiful and novel adaptations to their life style. As a consequence of this, some excellent monographs and related publications have appeared over the years. Recently a number of more broad-based publications have appeared enabling these fungi to be more widely used as teaching material in the undergraduate laboratory, (see for example Bell 1983; Richardson & Watling 1997). Nevertheless, there is still much basic systematic research to be done concerning these organisms. There remain vast areas of the world in which little, if any, investigation of the coprophilous mycoflora has been undertaken.

Australia is such a country. With its vast area, diverse ecology and unique marsupial fauna, it doubtless harbours a rich array of coprophilous fungi, a number of which may be endemic. To date only one mycologist, the notable Major Harry Dade, has done any study of the coprophilous fungal flora of Australia. This he undertook in his retirement years, but unfortunately died before publishing the results of his research. A biographical account of Major Dade's work will appear in a future publication concerning the coprophilous Ascomycetes of Australia.

Little research has been done concerning the coprophilous fungi of desert regions as a whole, although there are a few publications. For example, Angel & Wicklow (1975) describe the succession of coprophilous fungi observed in a semi-arid short grass prairie of Colorado. In another paper the same authors (1983) describe the coprophilous fungal communities in semiarid to mesic grasslands in the western United States. Yocom & Wicklow (1980), describe the coprophilous fungal succession which they observed associated with vegetative succession in dunes. These aforementioned papers deal mainly with the ecology of certain coprophiles and their adaptations to their particularly dry environments.

Regarding fungi from other dry areas, Abdullah *et al.* (1977) record the coprophilous fungi from Iraq; Rattan & El-Buni (1979) describe coprophilous fungi from Libya. Bokhary *et al.* (1989) describe some coprophilous fungi identified in Saudi Arabia. There are a number of other publications dealing with country-distribution of these fungi, but little to indicate the collections as being from any particularly dry habitats.

The following is an account of a new species of coprophilous Ascomycete belonging to the genus *Podospora*. It was isolated from the dung of the Black footed Rock Wallaby (*Petrogale lateralis*) collected by Ms Ceri Pearce in a desert area in the Northern Territory. This fungus was noted during the course of a project on the coprophilous Ascomycetes of Australia funded by the Australian Biological Resources Programme (ABRS). Dried dung collected for this project was forwarded to the current author by Dr Tom May at the Herbarium, Melbourne Botanic Gardens, Victoria.

Materials and Methods

The dung was initially soaked in sterile distilled water before incubating it on to moist filter paper in a lidded glass container (Lundqvist 1972, Bell, 1983). Observations of the fungus were made from water mounts of the fungus in its fresh state, which is by far the most preferable way in which to study these fungi. A number of semipermanent slides were also made using Shear's mounting medium; (Recipe: 300 ml. 2% potassium acetate, 120 ml. glycerine, 180 ml 95% ethyl alcohol. Mix and filter).

A portion of the material was air dried to provide herbarium material. Although all morphological characters were taken into account when describing this species, experience has shown that characters such as ascospore size and shape are much more reliable than the dimensions of elastic structures such as length of asci (Bell & Mahoney 1995). A total of 50 ascospores in water mounts were measured from the fresh material.

Cultures were obtained by germinating discharged ascospores which had been immersed in a 3% solution of hydrogen peroxide for 20 min. after which they were streaked across a Petri dish containing 2% water agar. This pretreatment prior to plating had the advantage of killing any unwanted bacteria which may have interfered with the subsequent growth of the fungus. The thick walls of the ascospores may protect them from immersion in the peroxide solution although we have no idea if some of them might be damaged this way, since not all treated ascospores germinate (Bell & Mahoney 1995). Live cultures of this fungus are maintained on Difco Cornmeal agar slopes stored at approximately 0° C at the School of Biological Sciences, Victoria University, P.O. Box 600, Wellington, New Zealand.

Taxonomy

Podospora petrogale A. Bell, *sp. nov.*

Perithecia aggregare, subterranea, sphaeroidea, 1 mm. in diametro, collumi nigro, glabrum, opacum, emersum. Asci 8-spori, sporae uniseratae maturitate transverse uniseptatae, cella superior (45–)50–58(–60) × (24–)26–30(–32) µm, ellipsoidea vel ovidea, nigrobrunnea, poro germinali apicali, cellula inferior (pedicellus) 12–20 × 4 µm cylindracea, hyalina, recta aut inclinata, distalis lageniformis, evanescens. Tota spora tunica gelatinoso crassus in aqua inflatum, evanescens.

Type: Australia, Northern Territory, Simpson Gap, McDonald Ranges near Alice Springs, Lat., 23° 43', Long. 133° 43', substrate (= dung of *Petrogale lateralis*), 12th Oct. 1997, C.A. Pearce. (holotype MEL 2062227; isotype WELTU Fungus Collection no. 684).

Etymology: Referring to the substrate (dung of *Petrogale lateralis*) upon which the fungus was found.

Characteristics on dung: Perithecia aggregated but not confluent, submerged beneath the dung surface. Venters more or less spherical, approximately 1 mm in diameter, covered with adhering pieces of ingested vegetation from the dung, very thin walled, readily bursting in water to release their contents. Necks smooth and black, emergent from the dung surface (Fig. 2A). Paraphyses packed around the asci, free ended, consisting of single chains of cells with some lateral connections (Fig. 2C). Asci cylindric or slightly clavate with a short stalk, approx. 300 × 50 µm, 8-spored. No apical apparatus observed. Ascospores uniseriate, two celled and hyaline at an early stage (Fig. 2D). Upper cell becoming black at maturity, ellipsoidal to slightly ovoid, mostly equilateral but occasionally slightly inequilateral, (45–)50–58(–60) × (24–)26–30(–32) µm, with a prominent apical germ pore 4–6 µm in diameter (Fig. 2C,E,F,G). Hyaline basal cell (=pedicel) straight or slightly inclined to the upper cell, cylindrical often swelling beneath its distal end, 12–20 × 4 µm, evanescent. A broad gelatinous sheath encompasses each ascospore such as to give a cellular appearance to intact asci (Fig. 2C). Upon release in

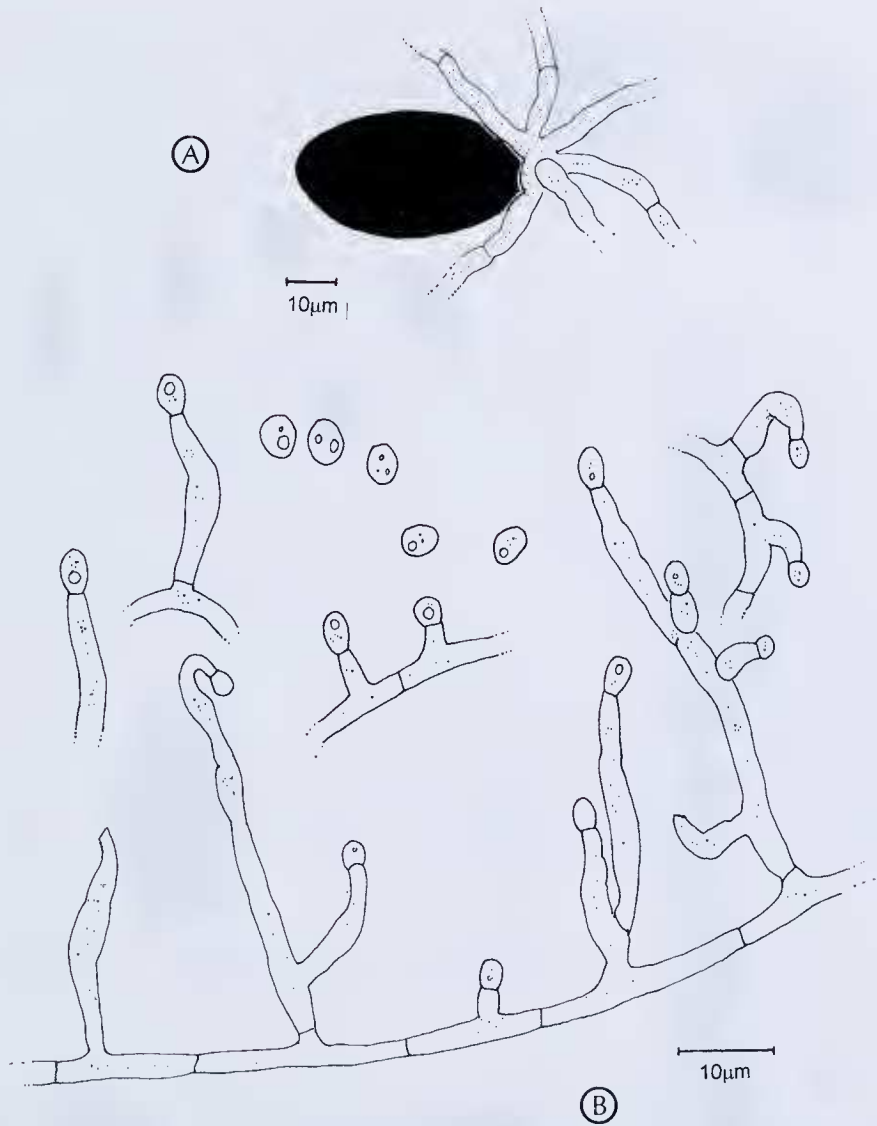


Fig. 1. *Podospora petrogale* A Germinating ascospore; B *Phialophora* anamorph of *Podospora petrogale*. For further explanation see text.

water these sheaths swell enormously (up to a diameter of 50 µm), and discharged ascospores adhere by means of these sheaths (Fig. 2B). In some instances the gelatinous sheaths are extended around the distal ends of the pedicels, or the pedicels may be entirely included within the sheaths (Fig. 2B,D,E). Although the gelatinous sheaths remain visible inside the intact asci in semi-permanent mounting media (at least for the duration of 8 months), gelatinous sheaths and pedicels of released ascospores dissipate over time. Discharged ascospores showing pedicels in various stages of dissolution are illustrated in Fig. 2 E,F.

Characteristics in culture: Ascospores produce a number of radiating hyphae from the germination tubes on 2% water agar (Fig. 1A). When transferred to Difco Corn Meal

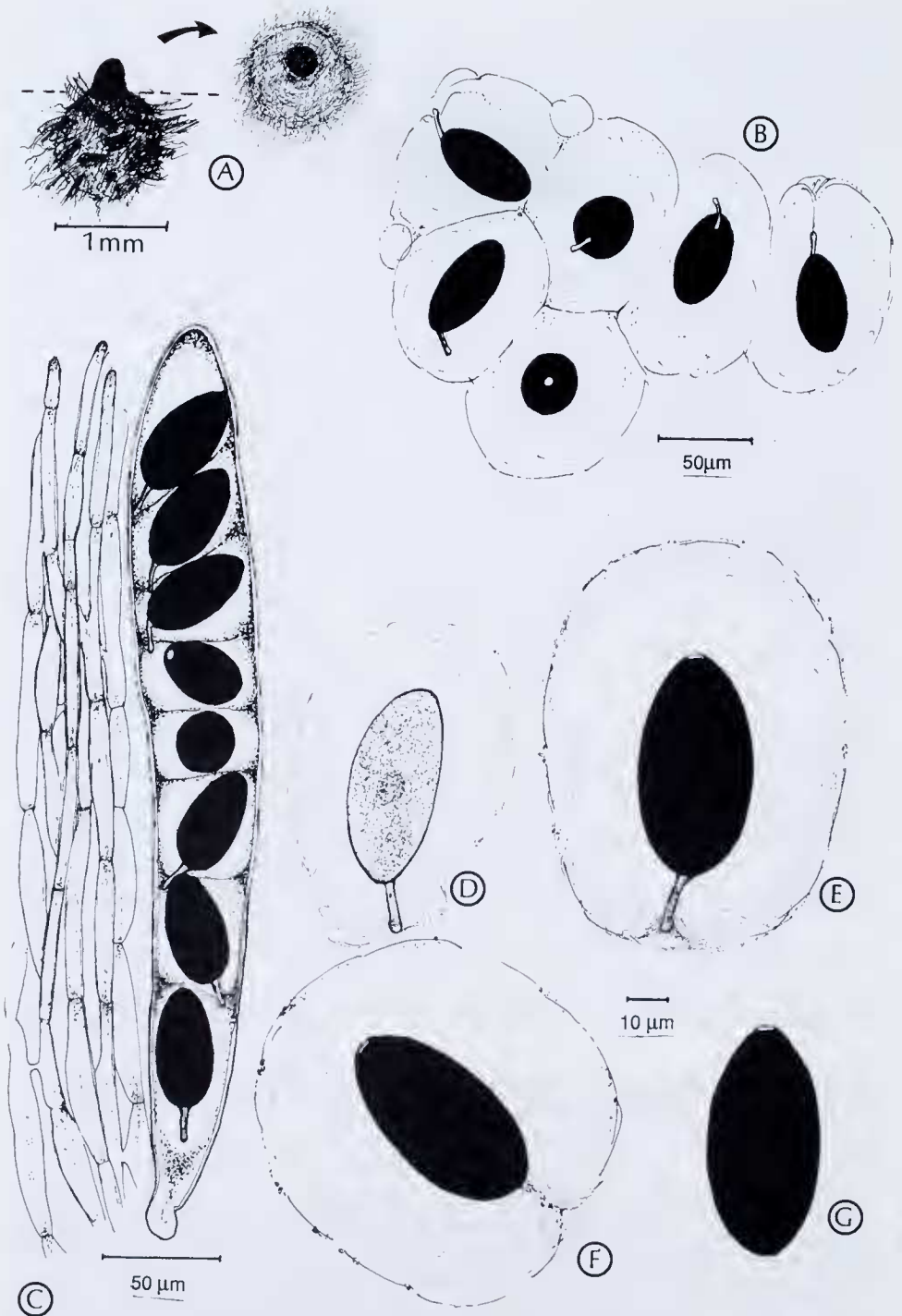


Fig. 2. *Podospora petrogale*, A = Two views of a perithecium, B = A cluster of discharged ascospores with gelatinous sheaths, C = Ascus and paraphyses, D = Immature ascospore, E = Mature ascospore with gelatinous sheath and pedicel intact, F = Mature ascospore with gelatinous sheath but pedicel partly dissolved, G = Mature ascospore minus sheath and pedicel.

agar, colonies were slow growing reaching a diameter of 0.5 cm in 2 weeks. Colonies hyaline, appressed, producing a *Phialophora* anamorph. Phialides developed singly or in loose groups along the lengths of septate hyphae. Phialides approximately $5\text{--}10 \times 2\text{--}3 \mu\text{m}$, sometimes nodding, occasionally branched, without collarettes at their distal ends (Fig. 1B). Phialoconidia $2\text{--}3 \mu\text{m}$, guttulate, smooth, hyaline, generally broadly obovoid, sometimes with one flattened side, with truncate bases (Fig. 1B). As yet no teleomorph produced in culture.

Discussion

Podospora petrogale is unique insofar as it exhibits features which are both reminiscent of the genus *Strattonia* Cif. (see Lundqvist 1972) and the genus *Podospora* Ces. The encompassing gelatinous sheath surrounding the ascospores is a feature of *Strattonia*, while the evanescent pedicel of *P. petrogale* is very similar in morphology to that found in various species of *Podospora* and quite unlike that described for species attributed to the genus *Strattonia*. Observation of discharged ascospores minus their pedicels could easily lead the observer to misinterpret this fungus for a species of *Sordaria* since there would be no way of knowing at which end of the ascospore the germination pore was situated. However, close scrutiny of such discharged ascospores usually reveals a minute flattened area of the ascospore wall marking the point of attachment of the pedicel.

There are at least 78 named species of the genus *Podospora* in Ainsworth & Bisby's *Dictionary of the Fungi* (1995). A number of monographic and related publications have appeared during recent years, ie. Mirza & Cain (1969), Furuya & Udagawa (1972), Khan & Cain (1972), (Bell 1983), Lundqvist (1970 & 1972), Krug & Khan (1989), Bell & Mahoney (1995 & 1997). However, there are some differences of opinion amongst these authors as to the limitations of the genus, and current knowledge would suggest that the genus may not be monophyletic. For these reasons it would be premature to suggest where *Podospora petrogale* lay regarding its nearest relatives within the genus especially since in aspects of its morphology it straddles both the genera *Podospora* and *Strattonia*.

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